

# PATENT ABSTRACTS OF JAPAN

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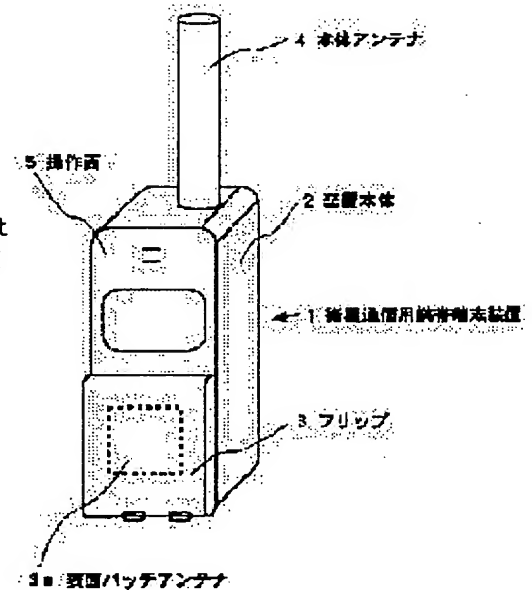
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## (54) PORTABLE INFORMATION COMMUNICATION TERMINAL

(57)Abstract:

**PROBLEM TO BE SOLVED:** To allow portable information communication terminal to ensure a stable electric field strength to an opposite party to/from which a radio wave is sent/received regardless of a placing direction of the terminal such as longitudinal placing and lateral placing.

**SOLUTION:** The terminal is provided with a flip 3 that protects an operation panel 5 and a patch antenna 3a is placed on a front side of the flip 3. In the case that the terminal is laterally placed on a desk or the like while its operation panel 5 is directed upward, the patch antenna 3a is directed vertically (in a direction of the zenith) thereby providing optimum antenna directivity to an opposite party to/from which a radio wave is sent/received and ensuring a stable electric field strength.



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## CLAIMS

[Claim(s)]

[Claim 1] The pocket information communication terminal characterized by arranging a patch antenna in the front face of said flip section while preparing the flip section which protects an actuation side in a pocket information communication terminal with a body antenna in the body upper limit section.

[Claim 2] The pocket information communication terminal according to claim 1 characterized by arranging a patch antenna also in the rear face of the flip section.

[Claim 3] The patch antenna of front flesh-side both sides of the flip section is a pocket information communication terminal according to claim 2 characterized by changing with the antenna transfer device built in said flip section, being chosen, and performing a diver city.

[Claim 4] The pocket information communication terminal according to claim 1 characterized by performing a diver city with the patch antenna arranged in the flip section front face, and a body antenna.

[Claim 5] The pocket information communication terminal according to claim 2 characterized by performing a diver city with the patch antenna arranged in the flip section front face, a body antenna and the patch antenna arranged in the flip section rear face, and said body antenna.

[Claim 6] The pocket information communication terminal according to claim 1 or 2 characterized by choosing the antenna which was built in the body, and which inclines, detects the sense of said body with detection equipment, and has the optimal antenna directivity to the transceiver partner of an electric wave.

[Claim 7] It is the pocket information communication terminal according to claim 1 characterized by performing a diver city with the patch antenna which was built in the body, and which inclined, and was not based on the detection result of detection equipment, but was arranged in the flip section front face, and a body antenna during arrival and a message.

[Claim 8] It is the pocket information communication terminal according to claim 2 characterized by performing a diver city with the patch antenna which was built in during arrival and a message, and which inclined, and was not based on the detection result of detection equipment, but was arranged in flip section both sides, and a body antenna.

[Claim 9] The pocket information communication terminal according to claim 2 characterized by enabling change selection of the patch antenna which detected closing motion of the flip section with the closing motion detection equipment built in the joint of the flip section and a body, and was arranged in flip section both sides.

[Claim 10] The pocket information communication terminal according to claim 1 or 2 characterized by building a low noise amplifier in the flip section.

## DETAILED DESCRIPTION

### [Detailed Description of the Invention]

[0001]

[Field of the Invention] Even if especially this invention is the case where the waiting receptacle is being performed about pocket information communication terminals, such as personal digital assistant equipment for satellite communication, in the condition (condition which it let lie down) have arranged the actuation side of equipment sideways upwards on a desk etc., it keeps the directivity of an antenna the optimal to the transceiver partner of the electric wave of a satellite office etc., and relates to the pocket information communication terminal which can aim at reservation of the stable field strength.

[0002]

[Description of the Prior Art] As for pocket information communication terminals, such as personal digital assistant equipment for satellite communication, what has the structure which formed the configuration of a case (body of equipment) in the rectangular parallelepiped mostly, and fixed the helical antenna, the patch antenna, etc. to the lengthwise direction upper limit section was common. For this reason, when awaiting and sometimes arranging on a desk etc., in order to turn an antenna perpendicularly (the direction of the zenith) from the directive relation of an antenna, it needs to arrange in the condition of having stood equipment. Moreover, although there were some which were equipped with the movable helical antenna, the patch antenna, etc. from the terminal unit lengthwise direction about the sense of an antenna, according to the orientation of equipment, the sense of an antenna had to be changed perpendicularly (the direction of the zenith) manually. What was indicated by JP,9-294286,A about the configuration method of the patch antenna of such personal digital assistant equipment for satellite communication is known.

[0003]

[Problem(s) to be Solved by the Invention] However, when it awaits and the actuation side has been sideways arranged upwards at the desk top etc. especially at the time, since an antenna is horizontally ( the direction of the ground) suitable with the helical antenna and the patch antenna fixed to the conventional terminal unit lengthwise direction and antenna directivity becomes weak in the direction of the terminal unit lower part, reservation of sufficient received electric field is difficult in the above-mentioned conventional personal digital assistant equipment for satellite communication to the electric wave which comes from the direction of the terminal unit lower part. Moreover, although there were some which were equipped with the movable helical antenna, the patch antenna, etc. from the terminal unit lengthwise direction about the sense of an antenna, there was a problem that the sense of an antenna had to be manually changed according to the orientation of a terminal.

[0004] This invention solves such a problem and it aims at offering the outstanding pocket information communication terminal which can aim at reservation of the field strength stabilized to the transceiver partner of an electric wave irrespective of the orientation of every - width every length.

[0005]

[Means for Solving the Problem] In order to solve the above-mentioned conventional trouble, while preparing the flip section which protects an actuation side in the pocket information communication terminal with a body antenna in the body upper limit section, the patch antenna was arranged in the front face of said flip section by this invention. Thus, even if it awaits and sometimes arranges an actuation side sideways upwards by constituting at a desk top etc., the optimal antenna directivity is given to the transceiver partner of an electric wave, and it becomes securable [ the stable field strength ].

[0006] Moreover, it considered as the configuration which performs a diver city with the patch antenna which was built in during the arrival of a pocket information communication terminal, and a message, and which inclined, and was not based on the detection result of detection equipment, but was arranged in the flip section, and a body antenna. Thus, by constituting, it becomes possible to secure the field strength stabilized also to change of the sense of a pocket information communication terminal in use.

[0007] Furthermore, it awaited, and it inclined, detection equipment detected the orientation of a

terminal unit, and, sometimes, it considered as the configuration which changes and chooses the antenna which was built in the pocket information communication terminal, and which has the optimal directivity to the transceiver partner of an electric wave. Thus, by constituting, it becomes possible to secure stable received electric field.

[0008] Moreover, the low noise amplifier was built in the flip section. Thus, by constituting, it becomes possible to suppress loss between a low noise amplifier and the patch antenna arranged in the flip section to the minimum.

[0009]

[Embodiment of the Invention] While invention of this invention according to claim 1 prepares the flip section which protects an actuation side in a pocket information communication terminal with a body antenna in the body upper limit section When the patch antenna which was the pocket information communication terminal which arranged the patch antenna in the front face of said flip section, and was arranged in the front face when the actuation side had been sideways arranged upwards on a desk etc. turns to a perpendicular (the direction of the zenith) It has an operation of securing the field strength which gave the optimal antenna directivity and was stabilized to the transceiver partner of an electric wave.

[0010] Invention of this invention according to claim 2 is the pocket information communication terminal which arranged the patch antenna also in the rear face of the flip section in a pocket information communication terminal according to claim 1, and when the patch antenna arranged in the rear face of the flip section is perpendicularly (the direction of the zenith) suitable during the use which opens the flip section, it has an operation of secure the field strength which gave the optimal antenna directivity and was stabilized to the transceiver partner of an electric wave.

[0011] In a pocket information communication terminal according to claim 2, the patch antenna of front flesh-side both sides of the flip section is a pocket information communication terminal which changes with the antenna transfer device built in said flip section, is chosen, and performs a diver city, and invention of this invention according to claim 3 has an operation of performing the diver city between the patch antennas arranged in front flesh-side both sides of the flip section.

[0012] In a pocket information communication terminal according to claim 1, invention of this invention according to claim 4 is a pocket information communication terminal which performs a diver city with the patch antenna arranged in the flip section front face, and a body antenna, and has an operation of choosing the antenna which can secure the field strength stabilized also to change of the orientation of a pocket information communication terminal.

[0013] Invention of this invention according to claim 5 is a pocket information communication terminal which performs a diver city with the patch antenna and the body antenna which were arranged in the flip section front face, and the patch antenna arranged in the flip section rear face and said body antenna, and has an operation of choosing the antenna which can secure the field strength stabilized also to change of the orientation of a pocket information communication terminal, in a pocket information communication terminal according to claim 2.

[0014] In a pocket information communication terminal according to claim 1 or 2, it inclines and detection equipment detects the sense of said body, and invention of this invention according to claim 6 is a pocket information communication terminal which chooses the antenna which was built in the body, and which has the optimal antenna directivity to the transceiver partner of an electric wave, and has an operation of choosing the antenna which has the optimal antenna directivity to the transceiver partner of an electric wave according to the sense of a terminal body.

[0015] Invention of this invention according to claim 7 is the pocket information communication terminal which performs a diver city with the patch antenna which was built in the body, and which inclined, and was not based on the detection result of detection equipment, but was arranged in the flip section front face, and a body antenna, and has an operation of securing the field strength stabilized also to change of the sense of a pocket information communication terminal in use, during arrival and a message in a pocket information communication terminal according to claim 1.

[0016] Invention of this invention according to claim 8 is the pocket information communication terminal

which performs a diver city with the built-in patch antenna which inclined , and was not based on the detection result of detection equipment , but was arranged in flip section both sides , and a body antenna , and has an operation of secure the field strength stabilized also to change of the sense of a pocket information communication terminal in use , during arrival and a message in a pocket information communication terminal according to claim 2 .

[0017] Invention of this invention according to claim 9 is set to a pocket information communication terminal according to claim 2. It is the pocket information communication terminal which changed the patch antenna which detected closing motion of a flip with the closing motion detection equipment built in the joint of the flip section and a body, and was arranged in flip section both sides, and made selection possible. When having closed the flip, the patch antenna arranged in the flip front face is chosen, and while opening the flip, it has an operation of choosing the patch antenna arranged in the flip rear face.

[0018] In a pocket information communication terminal according to claim 1 or 2, invention of this invention according to claim 10 is the pocket information communication terminal which contained the low noise amplifier in the flip section, and has an operation of suppressing loss between a low noise amplifier and the patch antenna arranged in the flip section to the minimum.

[0019] Hereafter, the gestalt of operation of this invention is explained to a detail, referring to a drawing.

[0020] Drawing 1 and drawing 2 are the perspective views of the appearance of the personal digital assistant equipment for satellite communication which applied this invention. Drawing 1 is in the condition which closed the flip of this personal digital assistant equipment for satellite communication here, and drawing 2 is in the condition which opened the flip.

[0021] This personal digital assistant equipment 1 for satellite communication (it abbreviates to personal digital assistant equipment hereafter) is constituted so that the transverse plane of the body 2 of equipment mostly formed in the rectangular parallelepiped may turn into the actuation side 5. The lower part is covered from the upper part, and a loudspeaker, a display, various keys, etc. are arranged in the actuation side 5. The flip 3 is formed in the lower part of the transverse plane of the body 2 of equipment. And the rod-like body antenna 4 is being fixed to the upper limit side of the body 2 of equipment.

[0022] Flip 3 is mostly formed in tabular [ rectangular ], is rocked focusing on the joint of the lower limit, and can be opened and closed. And when not using this personal digital assistant equipment 1 When changing flip 3 into the closed condition by which it is shown in drawing 1 , covering the various keys arranged by the lower part of the actuation side 5, protecting them and using this personal digital assistant equipment 1 By rotating flip 3 to the method of forward presence about about 90 degrees, it changes into the open condition by which it is shown in drawing 2 , and various keys etc. are exposed and those actuation is enabled. Moreover, with the gestalt of this operation, surface patch antenna 3a is arranged in the front face of flip 3, and rear-face patch antenna 3b is arranged in the rear face.

[0023] Drawing 3 is drawing showing the directive example of the body antenna 4. thus, the body antenna 4 -- the directivity of the range of an elevation angle a horizontal direction (the direction of the ground) to 20 degrees or more -- it has 7. Active jamming of the electric wave which comes from the ground is avoidable with this.

[0024] Next, outline actuation of the personal digital assistant equipment 1 constituted as mentioned above is explained. First, to the electric wave which comes from the lower part of personal digital assistant equipment 1 while receiving active jamming of the electric wave which the body antenna 4 will turn to the direction of the ground when the waiting receptacle is being performed in the condition of having arranged the actuation side 5 sideways upwards on a table as shown in drawing 4 , and comes from the ground, directivity will become weak. However, surface patch antenna 3a arranged in the front face of flip 3 becomes possible [ giving the optimal directivity to a satellite station ] in order to turn to the direction of the zenith. Moreover, as shown in drawing 2 , in order to open and use flip 3 during a message, both the rear-face patch antenna 3b and body antennas 4 that have been arranged at the rear face of flip 3 will be perpendicularly (the direction of the zenith) suitable, and become possible [ giving

the optimal directivity to a satellite office ].

[0025] Thus, with the personal digital assistant equipment 1 of the gestalt of operation of this invention, since the patch antenna was formed in the front face of flip 3, even if it is the case where the waiting receptacle is being performed where the actuation side 5 is sideways arranged upwards on a table, the directivity of an antenna can be kept the optimal to a satellite office, and reservation of the stable field strength can be aimed at. Moreover, while flip 3 exposes various keys and enables the actuation by rotating and opening centering on a shaft parallel to right and left of the actuation side 5 at the time of use of personal digital assistant equipment 1, the rear face of flip 3 is turned in the direction of the zenith, and it becomes possible about the body antenna 4 and rear-face patch antenna 3b to give the optimal directivity to a satellite station.

[0026] Next, the configuration and actuation of an electric system inside this personal digital assistant equipment 1 are explained. Drawing 5 is the block diagram showing the configuration of the important section of the electric system of personal digital assistant equipment 1. Low noise amplifier 9c prepared in the body 2 of equipment amplifies the input signal of the body antenna 4, and outputs it to antenna transfer device 8b which consisted of diode switches etc. On the other hand, low noise amplifier 9a prepared in the flip 3 amplifies the input signal of surface patch antenna 3a, and it outputs to antenna transfer device 8a which consisted of diode switches etc., and low noise amplifier 9b amplifies the input signal of rear-face patch antenna 3b, and outputs it to said antenna transfer device 8a. Moreover, the inclination detection equipment 10 formed in the body 2 of equipment detects the inclination of the body 2 of equipment, and outputs it to a control unit 12. The closing motion detection equipment 11 by the reed switch formed in the joint 14 of the body 2 of equipment and the flip section 2 detects the switching condition of the flip section 2, and outputs it to a control unit 12. A control unit 12 generates and outputs the change control signal of the antenna transfer devices 8a and 8b based on the output of inclination detection equipment 10, and the output of closing motion detection equipment 11. According to the change control signal from a control circuit 12, antenna transfer device 8a changes and chooses the output of low noise amplifiers 9a and 9b, and outputs it. Moreover, according to the change control signal from a control circuit 12, antenna transfer device 8b changes and chooses the output of low noise amplifier 9c, and the output of antenna transfer device 8a, and outputs them. A receiving circuit 13 receives the output of antenna transfer device 8b.

[0027] Next, the concrete configuration and actuation of inclination detection equipment 10 are explained, referring to drawing 6. It is fixed to the body 2 of equipment, and inclination detection equipment 10 is equipped with the reed switch 15, the metal plate 16 supported with the supporting point 18, and the magnet 17. And although a reed switch 15 and a magnet 17 incline and the sense changes according to the inclination of detection equipment 10, the metal plate 16 supported with the supporting point 18 is constituted so that the supporting point 18 may always turn to the direction of the zenith.

[0028] Thus, when it inclines as it inclines and detection equipment is shown in drawing 6 (a), detection equipment has turned to the direction of the zenith, and the metal plate 16 supported at the supporting point 18 interrupts the field of a magnet 17, a reed switch 15 serves as [ at which it was constituted ] OFF. Since a reed switch 15 and a magnet 17 incline and when it inclines on the other hand as shown in drawing 6 (b), and detection equipment turns to the direction of the ground rotates 90 degrees with detection equipment, the metal plate 16 supported at the supporting point 18 will not interrupt the field of a magnet 17, and a reed switch 15 becomes ON. Therefore, the inclination of the body 2 of equipment is detectable with ON/OFF of a reed switch 15.

[0029] Next, the antenna change selection actuation of an electric system shown in drawing 5 using the flow chart of drawing 7 is explained.

[0030] First, if the power source of personal digital assistant equipment 1 is switched on (step S1), it awaits in under arrival of the mail and a message, and inner detection will be performed (step S2), it will await in under arrival of the mail and a message at step S3, and an inner judgment will be performed. Here, when having detected that the flip 3 is open with closing motion detection equipment 11, it is under message, and it awaits in under a message, and when having detected having closed, an inner

judgment is awaited and judges with inside.

[0031] And when judged with under arrival of the mail and a message, it progresses to step S7 and diver city actuation is performed by the body antenna 4 and rear-face patch antenna 3b arranged in the rear face of flip 3. In this case, since equipment 1 is in the condition which showed in drawing 2, antenna transfer device 8a chooses the output of low noise amplifier 9b, and a control unit 12 controls it so that antenna transfer device 8b changes the output of antenna transfer device 8a, and the output of low noise amplifier 9c.

[0032] The inclination detection equipment 10 which progressed to step S4 at step S3 when it was judged with it not being under message (while awaiting), arrival of the mail and, and was built in the personal digital assistant equipment 1 for satellite communication detects the orientation of personal digital assistant equipment 1. And if the orientation of a terminal unit 1 is judged at step S5 to be a perpendicular (condition shown in drawing 1), it progresses to step S8, and it will be based on the body antenna 4, and will await, and actuation will be started. At this time, a control unit 12 is controlled so that antenna transfer device 8b chooses the output of low noise amplifier 9c.

[0033] On the other hand, if it judges that the orientation of a terminal unit 1 is level (condition shown in drawing 4) at step S5, it progresses to step S6, and it will be based on surface patch antenna 3a arranged in the front face of flip 3, and will await, and actuation will be started. At this time, a control unit 12 is controlled so that antenna transfer device 8a chooses the output of low noise amplifier 9a and antenna transfer device 8b chooses the output of antenna transfer device 8a.

[0034] as mentioned above, when equipment judges whether it is under [ communication link ] \*\*\*\*\* and judges with under a communication link with the gestalt of operation of this invention When it awaits by performing diver city actuation using the body antenna 4 and rear-face patch antenna 3b and judges with inside Since it constituted so that the antenna which has directivity in the direction of the zenith according to the orientation of equipment might be chosen No matter it may await and the inner sense may be what thing, the directivity of an antenna can always be kept the optimal to a satellite office, and the sense under the arrival of equipment and message or the stable field strength can be secured. Moreover, it becomes possible by building low noise amplifiers 9a and 9b in flip 3 to suppress the transmission loss between the patch antennas 3a and 3b, low noise amplifier 9a, and 9b to the minimum, and to suppress degradation of receiver sensibility to the minimum.

[0035] In addition, in the terminal unit 1 explained above, the diver city between surface patch antenna 3a and rear-face patch antenna 3b can also be performed during arrival of the mail and a message. Moreover, the output of closing motion detection equipment 11 can detect closing motion of flip 3, and change selection of surface patch antenna 3a and rear-face patch antenna 3b can also be performed. Furthermore, even if it arranges a patch antenna only in the front face of flip 3, in case [ of the condition of having arranged the actuation side sideways upwards ] it awaits, the directivity of an antenna can be kept the optimal to a satellite office, and the stable field strength can be secured. Moreover, the flip 3 was constituted from a gestalt of said operation so that the surroundings of a shaft parallel to an actuation side might be rocked, opened and closed in the lower limit of a body 1, but flip 3 should just be the structure where the rear face can be suitable above the body 2 of equipment, when it opens.

[0036]

[Effect of the Invention] Thus, since the patch antenna was arranged in the front face of the flip section which protects an actuation side in this invention, even if it awaits and sometimes arranges an actuation side sideways upwards at a desk top etc., the optimal antenna directivity is given to the transceiver partner of an electric wave, and the effectiveness of becoming securable [ the stable field strength ] is acquired.

[0037] Moreover, since the patch antenna and body antenna which were built in during arrival and a message and which inclined, and were not based on the detection result of detection equipment, but were arranged in the flip section perform a diver city, the effectiveness of becoming possible to secure the field strength stabilized also to change of the sense in use is acquired.

[0038] Furthermore, it inclines and detection equipment detects the orientation of a terminal unit, and

since the antenna which awaited and was sometimes built in and which has the optimal directivity to the transceiver partner of an electric wave is changed and chosen, the effectiveness of enabling stable received electric field to secure is acquired.

[0039] Moreover, since the low noise amplifier was built in the flip section, the effectiveness of becoming possible to suppress loss between a low noise amplifier and the patch antenna arranged in the flip section to the minimum is acquired.



## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] The perspective view in the condition of having closed the flip of the personal digital assistant equipment which applied this invention,

[Drawing 2] The perspective view in the condition of having opened the flip of the personal digital assistant equipment which applied this invention,

[Drawing 3] Drawing showing the directive example of the body antenna of drawing 1 ,

[Drawing 4] Drawing showing the condition of having arranged the actuation side for the personal digital assistant equipment of drawing 1 sideways upwards on a table,

[Drawing 5] The block diagram showing the configuration of the important section of the electric system of the personal digital assistant equipment of drawing 1 ,

[Drawing 6] Drawing for explaining the concrete configuration and actuation of drawing 5 of inclination detection equipment,

[Drawing 7] It is the flow chart which shows the antenna change selection actuation of an electric system shown in drawing 5 .

### [Description of Notations]

1 Personal Digital Assistant Equipment for Satellite Communication

2 Body of Equipment

3 Flip

3a Surface patch antenna

3b Rear-face patch antenna

4 Body Antenna

5 Actuation Side

7 The Range of Antenna Directivity

8a Flip section antenna transfer device

8b A transfer device with a built-in body

9a The low noise amplifier for surface patch antennas

9b The low noise amplifier for rear-face patch antennas

9c The low noise amplifier for body antennas

10 Inclination Detection Equipment

11 Closing Motion Detection Equipment

12 Control Unit

13 Receiving Circuit

14 Joint

15 Reed Switch

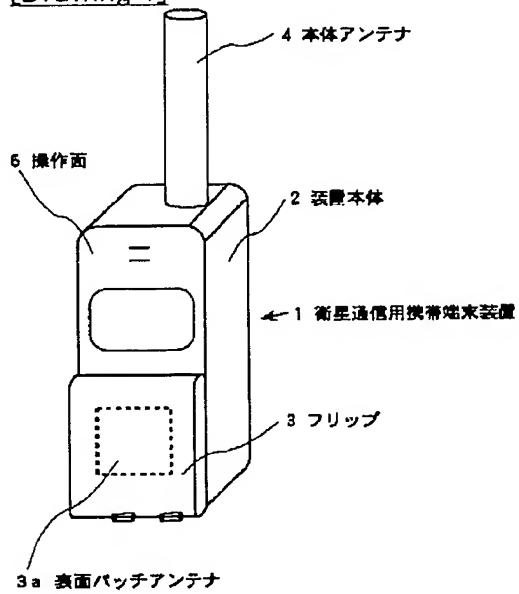
16 Metal Plate

17 Magnet

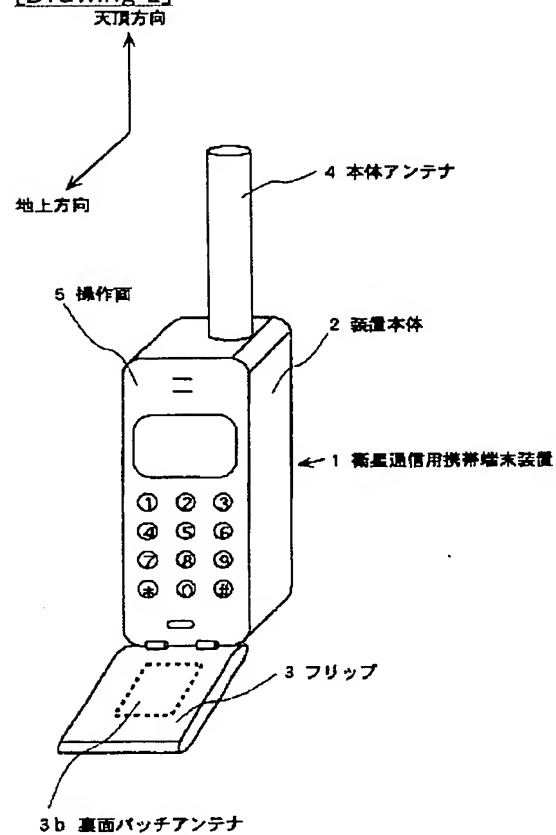
18 Supporting Point

## DRAWINGS

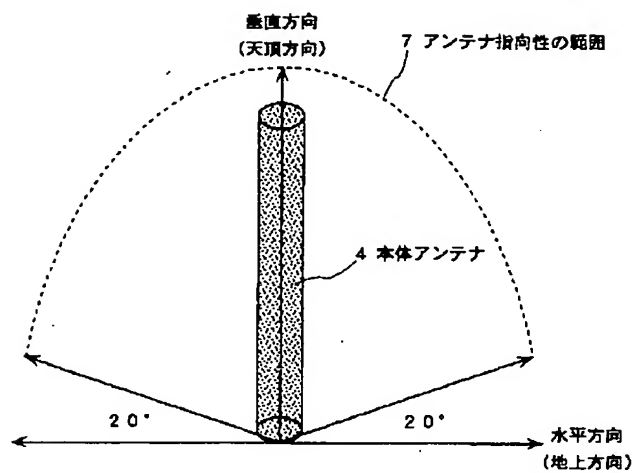
[Drawing 1]



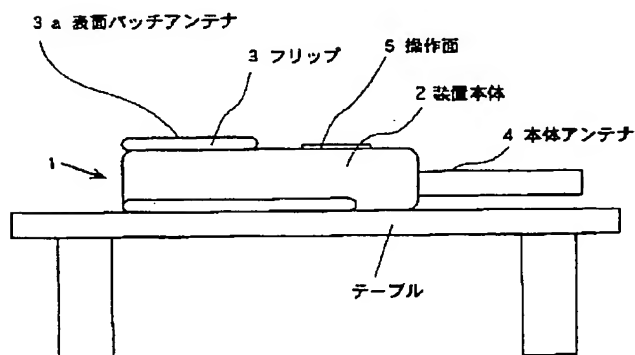
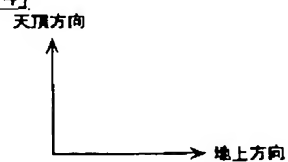
[Drawing 2]



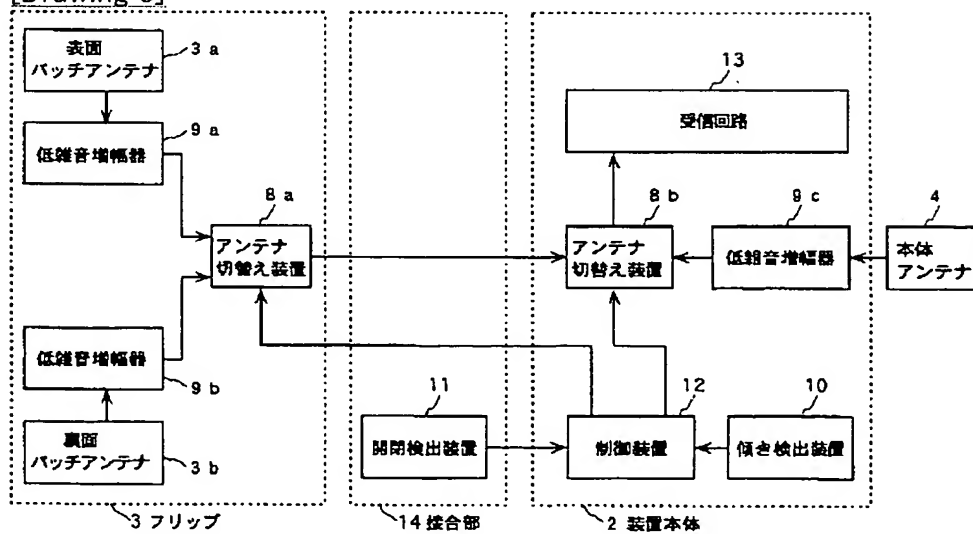
[Drawing 3]



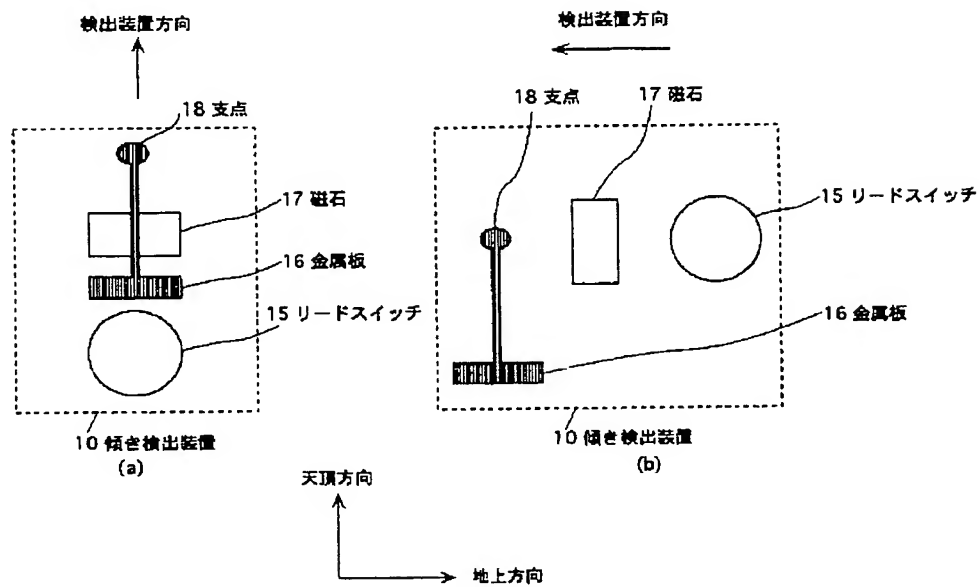
[Drawing 4]



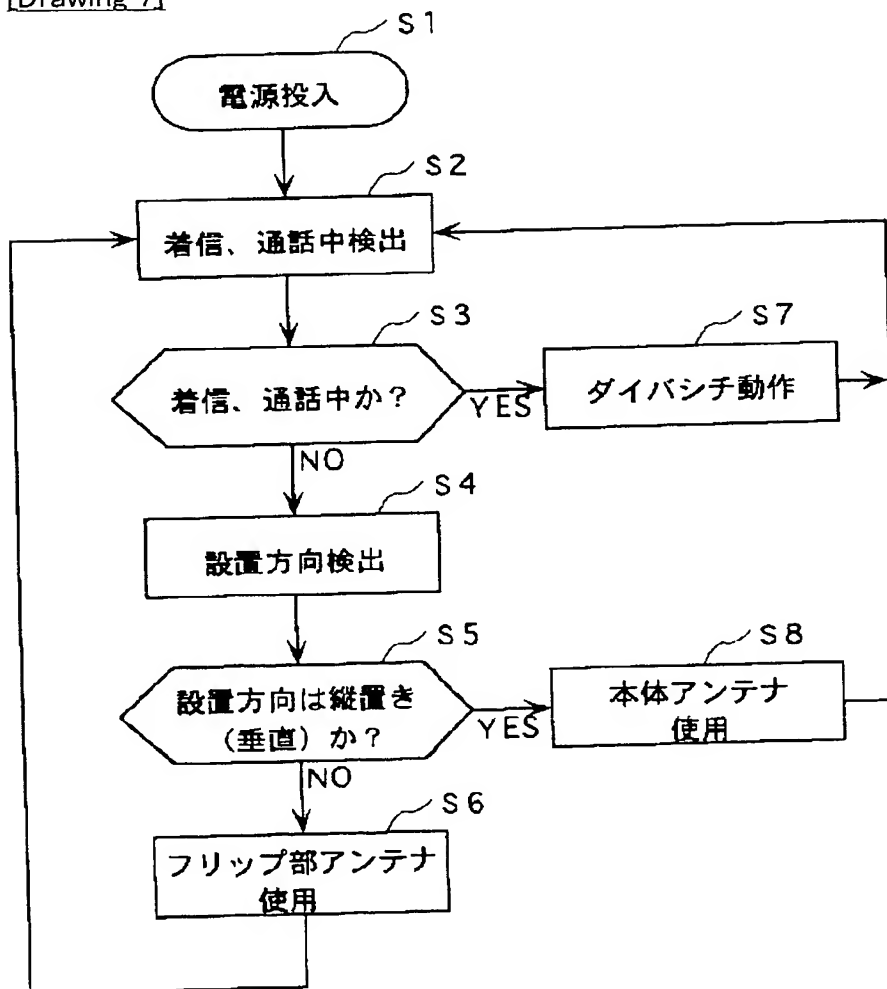
[Drawing 5]



[Drawing 6]



[Drawing 7]



(19)日本国特許庁 (J P)

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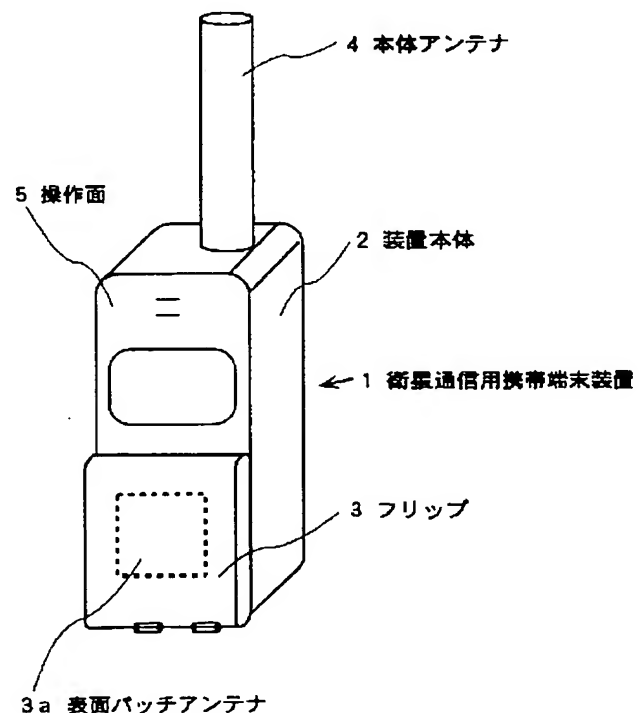
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(54)【発明の名称】 携帯情報通信端末装置

(57)【要約】

【課題】 携帯情報通信端末装置において、縦置き・横置き配置方向に関わらず、電波の送受信相手に対し安定した電界強度を確保する。

【解決手段】 操作面5を保護するフリップ3を設けるとともに、フリップ3の表面にパッチアンテナ3aを配設した。机上などに操作面5を上に向き横置きに配置した場合、パッチアンテナ3aが垂直(天頂方向)を向くことにより、電波の送受信相手に対して最適なアンテナ指向性を持たせ安定した電界強度の確保が可能となる。



【特許請求の範囲】

【請求項1】 本体上端部に本体アンテナを有した携帯情報通信端末装置において、操作面を保護するフリップ部を設けるとともに、前記フリップ部の表面にパッチアンテナを配設したことを特徴とする携帯情報通信端末装置。

【請求項2】 フリップ部の裏面にもパッチアンテナを配設したことを特徴とする請求項1記載の携帯情報通信端末装置。

【請求項3】 フリップ部の表裏両面のパッチアンテナは前記フリップ部に内蔵されたアンテナ切替え装置により切替え選択されてダイバシチを行うことを特徴とする請求項2記載の携帯情報通信端末装置。

【請求項4】 フリップ部表面に配設されたパッチアンテナと本体アンテナとでダイバシチを行うことを特徴とする請求項1記載の携帯情報通信端末装置。

【請求項5】 フリップ部表面に配設されたパッチアンテナと本体アンテナ、フリップ部裏面に配設されたパッチアンテナと前記本体アンテナとでダイバシチを行うことを特徴とする請求項2記載の携帯情報通信端末装置。

【請求項6】 本体に内蔵された傾き検出装置により前記本体の向きを検出し、電波の送受信相手に対して最適なアンテナ指向性を有するアンテナを選択することを特徴とする請求項1または2記載の携帯情報通信端末装置。

【請求項7】 着信中および通話中は本体に内蔵された傾き検出装置の検出結果によらず、フリップ部表面に配設されたパッチアンテナと本体アンテナとでダイバシチを行うことを特徴とする請求項1記載の携帯情報通信端末装置。

【請求項8】 着信中および通話中は内蔵された傾き検出装置の検出結果によらず、フリップ部両面に配設されたパッチアンテナと本体アンテナとでダイバシチを行うことを特徴とする請求項2記載の携帯情報通信端末装置。

【請求項9】 フリップ部と本体との接合部に内蔵された開閉検出装置によりフリップ部の開閉を検出してフリップ部両面に配設されたパッチアンテナの切替え選択を可能にしたことを特徴とする請求項2記載の携帯情報通信端末装置。

【請求項10】 フリップ部に低雑音増幅器を内蔵したことを特徴とする請求項1または2記載の携帯情報通信端末装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は衛星通信用携帯端末装置などの携帯情報通信端末装置に関し、特に机上などに装置の操作面を上に向き配置した状態（寝かせた状態）で待ち受けを行っている場合であっても、衛星局などの電波の送受信相手に対しアンテナの指向性を最適

に保ち、安定した電界強度の確保を図ることができる携帯情報通信端末装置に関する。

【0002】

【従来の技術】衛星通信用携帯端末装置などの携帯情報通信端末装置は筐体（装置本体）の形状をほぼ直方体に形成し、その縦方向上端部にヘリカルアンテナやパッチアンテナなどを固定した構造を有するものが一般的であった。このため、待ち受け時に机上などに配置する場合、アンテナの指向性の関係からアンテナを垂直方向（天頂方向）に向けるため、装置を立てた状態に配置する必要があった。また、アンテナの向きを端末装置縦方向から可動なヘリカルアンテナやパッチアンテナなどを備えたものもあるが、装置の配置方向に合わせてアンテナの向きを垂直方向（天頂方向）に手動で変えなければならなかった。このような衛星通信用携帯端末装置のパッチアンテナの配置方法に関しては特開平9-294286号に記載されたものが知られている。

【0003】

【発明が解決しようとする課題】しかしながら、上記従来の衛星通信用携帯端末装置においては、待ち受け時に特に机上などに操作面を上に向き配置した場合、従来の端末装置縦方向に固定されたヘリカルアンテナやパッチアンテナなどではアンテナが水平方向（地上方向）を向き、アンテナ指向性が端末装置下部方向において弱くなるため端末装置下部方向より到来する電波に対して十分な受信電界の確保が困難であった。また、アンテナの向きを端末装置縦方向から可動なヘリカルアンテナやパッチアンテナなどを備えたものもあるが、端末の配置方向に合わせてアンテナの向きを手動で変えなければならないという問題があった。

【0004】本発明はこのような問題を解決し、縦置き・横置きの配置方向にかかわらず、電波の送受信相手に対し安定した電界強度の確保を図ることができる優れた携帯情報通信端末装置を提供することを目的とする。

【0005】

【課題を解決するための手段】上記従来の問題点を解決するために本発明では、本体上端部に本体アンテナを有した携帯情報通信端末装置において、操作面を保護するフリップ部を設けるとともに、前記フリップ部の表面にパッチアンテナを配設した。このように構成することにより、待ち受け時に机上などに操作面を上に向き配置しても、電波の送受信相手に対して最適なアンテナ指向性を持たせ、安定した電界強度の確保が可能となる。

【0006】また、携帯情報通信端末装置の着信中および通話中は内蔵された傾き検出装置の検出結果によらず、フリップ部に配設されたパッチアンテナと本体アンテナとでダイバシチを行う構成とした。このように構成することにより、携帯情報通信端末装置の使用時の向きの変化に対しても安定した電界強度を確保することが可能となる。

【0007】さらに、待ち受け時には携帯情報通信端末装置に内蔵された傾き検出装置により端末装置の配置方向を検出し、電波の送受信相手に対して最適な指向性を持つアンテナを切替え選択する構成とした。このように構成することにより、安定した受信電界を確保することが可能となる。

【0008】また、フリップ部に低雑音増幅器を内蔵した。このように構成することにより、低雑音増幅器とフリップ部に配設されたパッチアンテナとの間の損失を最小限に抑えることが可能となる。

【0009】

【発明の実施の形態】本発明の請求項1に記載の発明は、本体上端部に本体アンテナを有した携帯情報通信端末装置において、操作面を保護するフリップ部を設けるとともに、前記フリップ部の表面にパッチアンテナを配設した携帯情報通信端末装置であり、机上などに操作面を上を横向きに配置した場合、表面に配設されたパッチアンテナが垂直（天頂方向）を向くことにより、電波の送受信相手に対して最適なアンテナ指向性を持たせ安定した電界強度を確保するという作用を有する。

【0010】本発明の請求項2に記載の発明は、請求項1記載の携帯情報通信端末装置において、フリップ部の裏面にもパッチアンテナを配設した携帯情報通信端末装置であり、フリップ部を開いての使用中にフリップ部の裏面に配設されたパッチアンテナが垂直方向（天頂方向）を向くことにより、電波の送受信相手に対して最適なアンテナ指向性を持たせ安定した電界強度を確保するという作用を有する。

【0011】本発明の請求項3に記載の発明は、請求項2記載の携帯情報通信端末装置において、フリップ部の表裏両面のパッチアンテナは前記フリップ部に内蔵されたアンテナ切替え装置により切替え選択されてダイバシチを行う携帯情報通信端末装置であり、フリップ部の表裏両面に配設されたパッチアンテナ間のダイバシチを行うという作用を有する。

【0012】本発明の請求項4に記載の発明は、請求項1記載の携帯情報通信端末装置において、フリップ部表面に配設されたパッチアンテナと本体アンテナとでダイバシチを行う携帯情報通信端末装置であり、携帯情報通信端末装置の配置方向の変化に対しても安定した電界強度を確保できるアンテナを選択するという作用を有する。

【0013】本発明の請求項5に記載の発明は、請求項2記載の携帯情報通信端末装置において、フリップ部表面に配設されたパッチアンテナと本体アンテナと、フリップ部裏面に配設されたパッチアンテナと前記本体アンテナとでダイバシチを行う携帯情報通信端末装置であり、携帯情報通信端末装置の配置方向の変化に対しても安定した電界強度を確保できるアンテナを選択するという作用を有する。

【0014】本発明の請求項6に記載の発明は、請求項1または2記載の携帯情報通信端末装置において、本体に内蔵された傾き検出装置により前記本体の向きを検出し、電波の送受信相手に対して最適なアンテナ指向性を有するアンテナを選択する携帯情報通信端末装置であり、端末本体の向きに応じて電波の送受信相手に対して最適なアンテナ指向性を持つアンテナを選択するという作用を有する。

【0015】本発明の請求項7に記載の発明は、請求項1記載の携帯情報通信端末装置において、着信中および通話中は本体に内蔵された傾き検出装置の検出結果によらず、フリップ部表面に配設されたパッチアンテナと本体アンテナとでダイバシチを行う携帯情報通信端末装置であり、携帯情報通信端末装置の使用中的の向きの変化に対しても安定した電界強度を確保するという作用を有する。

【0016】本発明の請求項8に記載の発明は、請求項2記載の携帯情報通信端末装置において、着信中および通話中は内蔵された傾き検出装置の検出結果によらず、フリップ部両面に配設されたパッチアンテナと本体アンテナとでダイバシチを行う携帯情報通信端末装置であり、携帯情報通信端末装置の使用中的の向きの変化に対しても安定した電界強度を確保するという作用を有する。

【0017】本発明の請求項9に記載の発明は、請求項2記載の携帯情報通信端末装置において、フリップ部と本体との接合部に内蔵された開閉検出装置によりフリップの開閉を検出してフリップ部両面に配設されたパッチアンテナを切替え選択を可能にした携帯情報通信端末装置であり、フリップを閉じている時はフリップ表面に配設されたパッチアンテナを選択し、フリップを開いている時はフリップ裏面に配設されたパッチアンテナを選択するという作用を有する。

【0018】本発明の請求項10に記載の発明は、請求項1または2記載の携帯情報通信端末装置において、フリップ部に低雑音増幅器を内蔵した携帯情報通信端末装置であり、低雑音増幅器とフリップ部に配設されたパッチアンテナ間の損失を最小限に抑えるという作用を有する。

【0019】以下、図面を参照しながら本発明の実施の形態について詳細に説明する。

【0020】図1および図2は本発明を適用した衛星通信用携帯端末装置の外観の斜視図である。ここで、図1はこの衛星通信用携帯端末装置のフリップを閉じた状態であり、図2はフリップを開いた状態である。

【0021】この衛星通信用携帯端末装置（以下、携帯端末装置と略す）1は、ほぼ直方体に形成された装置本体2の正面が操作面5となるように構成されている。操作面5には、その上部から下部にわたって、スピーカ一、表示部、各種キーなどが配設されている。装置本体2の正面の下部にはフリップ3が設けられている。そし

て、装置本体2の上端面には棒状の本体アンテナ4が固定されている。

【0022】フリップ3はほぼ矩形の板状に形成され、その下端の接合部を中心に揺動して開閉可能である。そして、この携帯端末装置1を使用しない時は、フリップ3を図1に示されている閉じた状態にして、操作面5の下部に配設された各種キーなどを覆ってそれらを保護し、この携帯端末装置1を使用する時は、フリップ3をほぼ90度程度正面前方へ回転させることにより、図2に示されている開いた状態にして各種キーなどを露出させ、それらの操作を可能にする。また、この実施の形態では、フリップ3の表面に表面パッチアンテナ3aが配設され、裏面には裏面パッチアンテナ3bが配設されている。

【0023】図3は本体アンテナ4の指向性の例を示す図である。このように、本体アンテナ4は水平方向（地上方向）から20°以上の仰角の範囲の指向性7を有している。これによって、地上方向から到来する電波の妨害を避けることができる。

【0024】次に以上のように構成された携帯端末装置1の概略動作を説明する。まず、図4に示すように、テーブルの上に操作面5を上を横向きに配置した状態で待ち受けを行っている場合、本体アンテナ4は地上方向を向くことになり、地上方向から到来する電波の妨害を受けるとともに、携帯端末装置1の下部方向から到来する電波に対しては指向性が弱くなってしまう。しかし、フリップ3の表面に配設された表面パッチアンテナ3aは天頂方向を向くことになるため、衛星局に対して最適な指向性を持たせることが可能となる。また、通話中は図2に示すように、フリップ3を開いて使用するため、フリップ3の裏面に配置された裏面パッチアンテナ3bおよび本体アンテナ4は共に垂直方向（天頂方向）を向くことになり、衛星局に対して最適な指向性を持たせることが可能となる。

【0025】このように、本発明の実施の形態の携帯端末装置1では、フリップ3の表面にパッチアンテナを設けたので、テーブルの上に操作面5を上を横向きに配設した状態で待ち受けを行っている場合であっても、衛星局に対しアンテナの指向性を最適に保ち、安定した電界強度の確保を図ることができる。また、携帯端末装置1の使用時には、フリップ3が操作面5の左右に平行な軸を中心に回転して開くことにより、各種キーを露出させてその操作を可能にするとともに、フリップ3の裏面を天頂方向に向け、本体アンテナ4および裏面パッチアンテナ3bを衛星局に対して最適な指向性を持たせることが可能となる。

【0026】次に、この携帯端末装置1の内部の電気系の構成と動作を説明する。図5は携帯端末装置1の電気系の要部の構成を示すブロック図である。装置本体2に設けられた低雑音増幅器9cは、本体アンテナ4の受信信

号を増幅して、ダイオードスイッチなどで構成されたアンテナ切替装置8bへ出力する。一方、フリップ3に設けられた低雑音増幅器9aは表面パッチアンテナ3aの受信信号を増幅して、ダイオードスイッチなどで構成されたアンテナ切替装置8aへ出力し、低雑音増幅器9bは裏面パッチアンテナ3bの受信信号を増幅して前記アンテナ切替装置8aへ出力する。また、装置本体2に設けられた傾き検出装置10は装置本体2の傾きを検出して制御装置12へ出力する。装置本体2とフリップ部2との接合部14に設けられたリードスイッチなどによる開閉検出装置11はフリップ部2の開閉状態を検出し、制御装置12へ出力する。制御装置12は、傾き検出装置10の出力と開閉検出装置11の出力とをもとに、アンテナ切替え装置8aおよび8bの切替え制御信号を生成し、出力する。アンテナ切替え装置8aは制御回路12からの切替え制御信号に従って低雑音増幅器9aおよび9bの出力を切替・選択して出力する。また、アンテナ切替え装置8bは制御回路12からの切替え制御信号に従って低雑音増幅器9cの出力およびアンテナ切替え装置8aの出力を切替・選択して出力する。受信回路13はアンテナ切替え装置8bの出力を受信する。

【0027】次に、図6を参照しながら、傾き検出装置10の具体的な構成と動作を説明する。傾き検出装置10は、装置本体2に固定されており、リードスイッチ15と、支点18で支えられた金属板16と、磁石17とを備えている。そして、リードスイッチ15と磁石17は傾き検出装置10の傾きに依りて向きが変化するが、支点18で支えられた金属板16は常に支点18が天頂方向を向くように構成されている。

【0028】このように構成された傾き検出装置において、図6(a)に示すように傾き検出装置が天頂方向を向いている時は支点18に支えられた金属板16が磁石17の磁界を遮ることによりリードスイッチ15はオフとなる。一方、図6(b)に示すように傾き検出装置が地上方向を向いた時は、リードスイッチ15と磁石17が傾き検出装置とともに90度回転するため、支点18に支えられた金属板16が磁石17の磁界を遮らなくなり、リードスイッチ15はオンとなる。したがって、リードスイッチ15のオン/オフにより、装置本体2の傾きを検出することができる。

【0029】次に、図7のフローチャートを用いて図5に示した電気系のアンテナ切替え選択動作を説明する。

【0030】まず、携帯端末装置1の電源が投入されると（ステップS1）、着信、通話中か待ち受け中の検出を行い（ステップS2）、ステップS3で着信、通話中か待ち受け中の判定を行う。ここで、通話中か待ち受け中の判定は、例えば開閉検出装置11によりフリップ3が開いていることを検出している時は通話中であり、閉じていることを検出している時は待ち受け中と判定する。

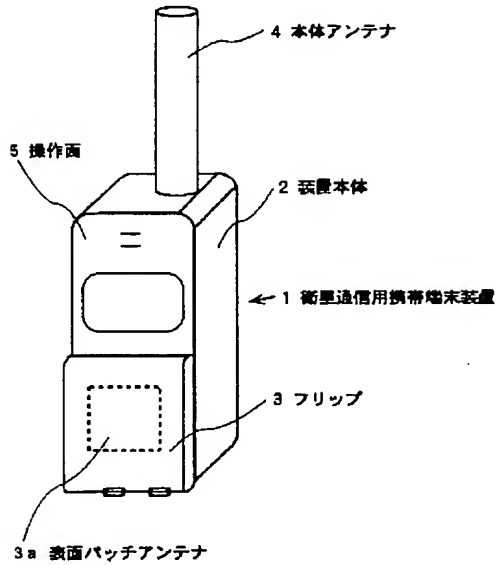
【0031】そして、着信、通話中と判定された場合は、ステップS7に進み、本体アンテナ4とフリップ3の



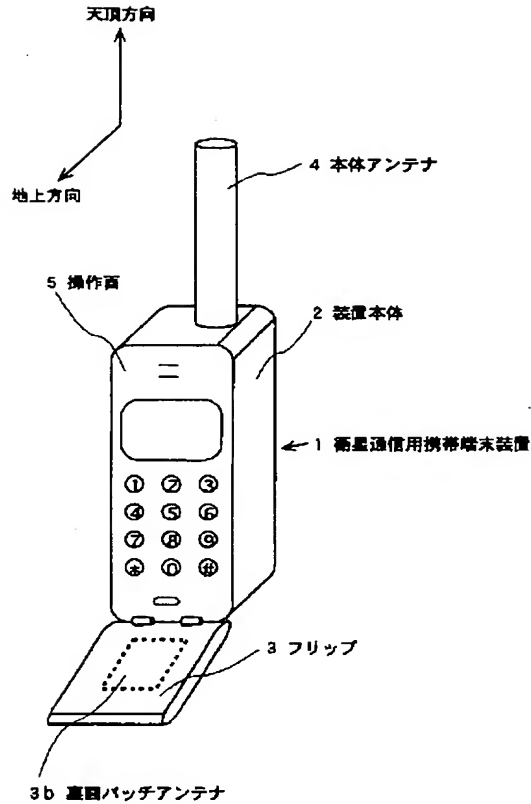
- 12 制御装置
- 13 受信回路
- 14 接合部
- 15 リードスイッチ

- 16 金属板
- 17 磁石
- 18 支点

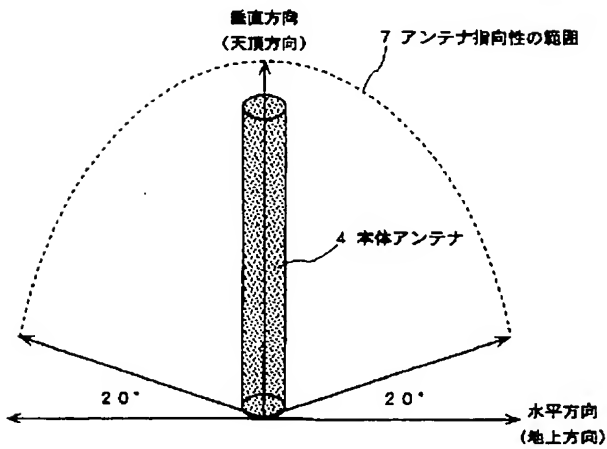
【図1】



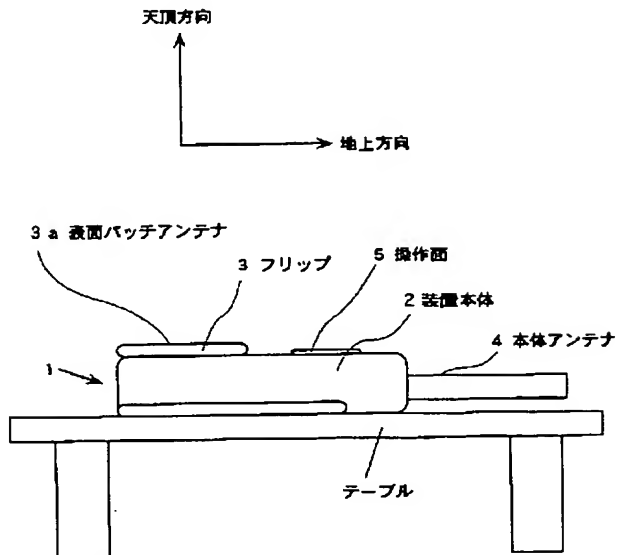
【図2】



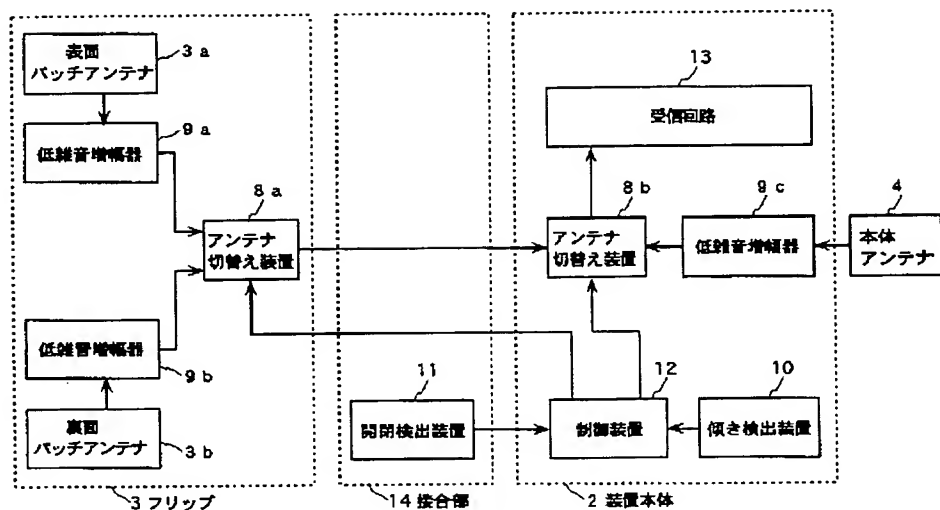
【図3】



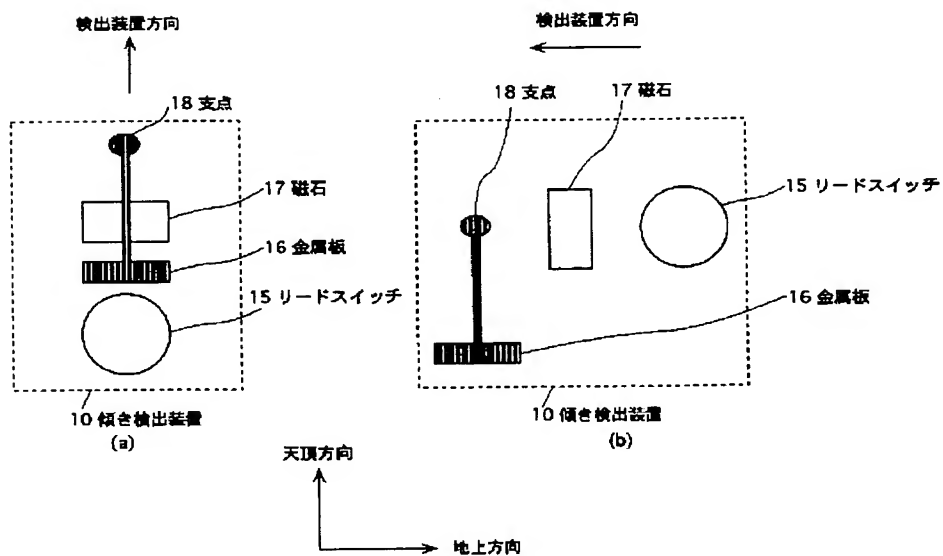
【図4】



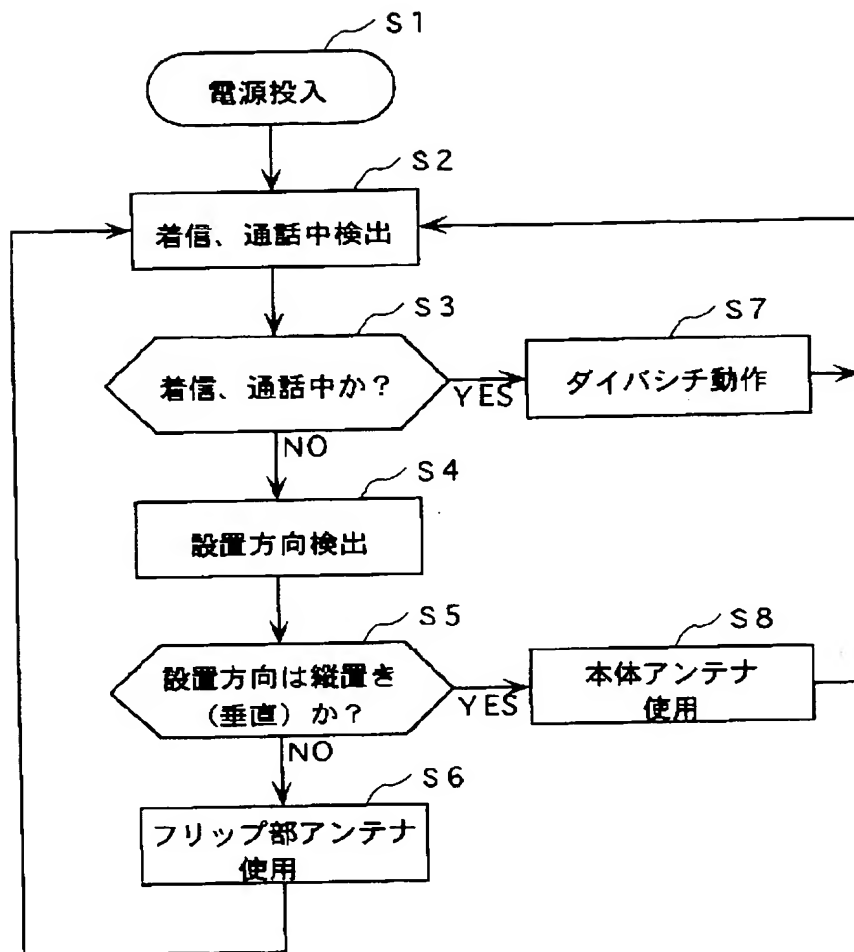
【図5】



【図6】



【図7】



フロントページの続き

(51)Int.Cl.<sup>7</sup>

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5J047 AA02 AA03 AB10 AB13 FD01  
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